

# Radiologic Technologists and Technicians

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## Significant Points

- Formal training programs in radiography range in length from 1 to 4 years and lead to a certificate, associate degree, or bachelor's degree.
- Although hospitals will remain the primary employer, a greater number of new jobs will be found in physicians' offices and diagnostic imaging centers.
- Job opportunities are expected to be favorable; some employers report difficulty hiring sufficient numbers of radiologic technologists and technicians.

## Nature of the Work

Radiologic technologists and technicians take x rays and administer nonradioactive materials into patients' bloodstreams for diagnostic purposes. Some specialize in diagnostic imaging technologies, such as computerized tomography (CT) and magnetic resonance imaging (MRI).

In addition to radiologic technologists and technicians, others who conduct diagnostic imaging procedures include cardiovascular technologists and technicians, diagnostic medical sonographers, and nuclear medicine technologists. (Each is discussed elsewhere in the *Handbook*.)

Radiologic technologists and technicians, also referred to as *radiographers*, produce x ray films (radiographs) of parts of the human body for use in diagnosing medical problems. They prepare patients for radiologic examinations by explaining the procedure, removing articles such as jewelry, through which x rays cannot pass, and positioning patients so that the parts of the body can be appropriately radiographed. To prevent unnecessary radiation exposure, these workers surround the exposed area with radiation protection devices, such as lead shields, or limit the size of the x ray beam. Radiographers position radiographic equipment at the correct angle and height over the appropriate area of a patient's body. Using instruments similar to a measuring tape, they may measure the thickness of the section to be radiographed and set controls on the x ray machine to produce radiographs of the appropriate density, detail, and contrast. They place the x ray film under the part of the patient's body to be examined and make the exposure. They then remove the film and develop it.

Experienced radiographers may perform more complex imaging procedures. For fluoroscopies, radiographers prepare a solution of contrast medium for the patient to drink, allowing the radiologist (a physician who interprets radiographs) to see soft tissues in the body. Some radiographers, called *CT technologists*, operate CT scanners to produce cross-sectional images of patients. Radiographers who operate machines that use strong magnets and radio waves, rather than radiation, to create an image are called *MRI technologists*.

Radiologic technologists and technicians must follow physicians' orders precisely and conform to regulations concerning the use of radiation to protect themselves, their patients, and their coworkers from unnecessary exposure.

In addition to preparing patients and operating equipment, radiologic technologists and technicians keep patient records and adjust and maintain equipment. They also may prepare

work schedules, evaluate equipment purchases, or manage a radiology department.

## Working Conditions

Most full-time radiologic technologists and technicians work about 40 hours a week; they may have evening, weekend, or on-call hours. Opportunities for part-time and shift work also are available.

Because technologists and technicians are on their feet for long periods and may lift or turn disabled patients, physical stamina is important. Technologists and technicians work at diagnostic machines, but may also perform some procedures at patients' bedsides. Some travel to patients in large vans equipped with sophisticated diagnostic equipment.

Although radiation hazards exist in this occupation, they are minimized by the use of lead aprons, gloves, and other shielding devices, as well as by instruments monitoring radiation exposure. Technologists and technicians wear badges measuring radiation levels in the radiation area, and detailed records are kept on their cumulative lifetime dose.

## Employment

Radiologic technologists and technicians held about 174,000 jobs in 2002. Almost 1 in 5 worked part time. About half of all jobs were in hospitals. Most of the rest were in offices of physicians; medical and diagnostic laboratories, including diagnostic imaging centers; and outpatient care centers.

## Training, Other Qualifications, and Advancement

Preparation for this profession is offered in hospitals, colleges and universities, vocational-technical institutes, and the U.S. Armed Forces. Hospitals, which employ most radiologic technologists and technicians, prefer to hire those with formal training.

Formal training programs in radiography range in length from 1 to 4 years and lead to a certificate, associate degree, or bachelor's degree. Two-year associate degree programs are most prevalent.

Some 1-year certificate programs are available for experienced radiographers or individuals from other health occupations, such as medical technologists and registered nurses, who want to change fields or specialize in CT or MRI. A bachelor's or master's degree in one of the radiologic technologies is desirable for supervisory, administrative, or teaching positions.



*Radiologic technologists use advanced imaging technology to create diagnostic images for interpretation by a physician.*

The Joint Review Committee on Education in Radiologic Technology accredits most formal training programs for the field. The committee accredited 587 radiography programs in 2003. Radiography programs require, at a minimum, a high school diploma or the equivalent. High school courses in mathematics, physics, chemistry, and biology are helpful. The programs provide both classroom and clinical instruction in anatomy and physiology, patient care procedures, radiation physics, radiation protection, principles of imaging, medical terminology, positioning of patients, medical ethics, radiobiology, and pathology.

Federal legislation protects the public from the hazards of unnecessary exposure to medical and dental radiation by ensuring operators of radiologic equipment are properly trained. Under this legislation, the Federal Government sets voluntary standards that the States, in turn, may use for accrediting training programs and certifying individuals who engage in medical or dental radiography.

In 2003, about 38 States licensed radiologic technologists and technicians. Voluntary registration is offered by the American Registry of Radiologic Technologists. To be eligible for registration, technologists generally must have graduated from an accredited program and pass an examination. Many employers prefer to hire registered radiographers. To be recertified, radiographers must complete 24 hours of continuing education every other year.

Radiologic technologists and technicians should be sensitive to patients' physical and psychological needs. They must pay attention to detail, follow instructions, and work as part of a team. In addition, operating complicated equipment requires mechanical ability and manual dexterity.

With experience and additional training, staff technologists may become specialists, performing CT scanning, angiography, and magnetic resonance imaging. Experienced technologists also may be promoted to supervisor, chief radiologic technologist, and, ultimately, department administrator or director. Depending on the institution, courses or a master's degree in business or health administration may be necessary for the director's position. Some technologists progress by leaving the occupation to become instructors or directors in radiologic technology programs; others take jobs as sales representatives or instructors with equipment manufacturers.

**Job Outlook**

Job opportunities are expected to be favorable. Some employers report difficulty hiring sufficient numbers of radiologic technologists and technicians. Imbalances between the demand for, and supply of, qualified workers should spur efforts to attract and retain qualified radiologic technologists and technicians. As an example of such efforts, employers may provide more flexible training programs or improve compensation and working conditions.

Radiologic technologists who also are experienced in more complex diagnostic imaging procedures, such as CT or MRI, will have better employment opportunities, as employers seek to control costs by using multiskilled employees.

Employment of radiologic technologists and technicians is expected to grow faster than the average for all occupations through 2012, as the population grows and ages, increasing the demand for diagnostic imaging. Although healthcare providers are enthusiastic about the clinical benefits of new technologies, the extent to which they are adopted depends largely on cost and reimbursement considerations. For example, digital imag-

ing technology can improve quality and efficiency, but remains expensive. Some promising new technologies may not come into widespread use because they are too expensive and third-party payers may not be willing to pay for their use.

Hospitals will remain the principal employer of radiologic technologists and technicians. However, a greater number of new jobs will be found in offices of physicians and diagnostic imaging centers. Health facilities such as these are expected to grow rapidly through 2012, due to the strong shift toward outpatient care, encouraged by third-party payers and made possible by technological advances that permit more procedures to be performed outside the hospital. Some job openings also will arise from the need to replace technologists and technicians who leave the occupation.

**Earnings**

Median annual earnings of radiologic technologists and technicians were \$38,970 in 2002. The middle 50 percent earned between \$32,370 and \$46,510. The lowest 10 percent earned less than \$27,190, and the highest 10 percent earned more than \$55,430. Median annual earnings in the industries employing the largest numbers of radiologic technologists and technicians in 2002 were as follows:

Medical and diagnostic laboratories .....	\$42,470
General medical and surgical hospitals .....	39,580
Offices of physicians .....	36,490

**Related Occupations**

Radiologic technologists and technicians operate sophisticated equipment to help physicians, dentists, and other health practitioners diagnose and treat patients. Workers in related occupations include cardiovascular technologists and technicians, clinical laboratory technologists and technicians, diagnostic medical sonographers, nuclear medicine technologists, radiation therapists, and respiratory therapists.

**Sources of Additional Information**

For career information, send a stamped, self-addressed business-size envelope with your request to:

► American Society of Radiologic Technologists, 15000 Central Ave. SE., Albuquerque, NM 87123-3917. Telephone (tollfree): 800-444-2778. Internet: <http://www.asrt.org>

For the current list of accredited education programs in radiography, write to:

► Joint Review Committee on Education in Radiologic Technology, 20 N. Wacker Dr., Suite 900, Chicago, IL 60606-2901. Internet: <http://www.jrcert.org>

For information on certification, contact:  
► American Registry of Radiologic Technologists, 1255 Northland Dr., St. Paul, MN 55120-1155. Internet: <http://www.arrt.org>